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THE FIELD STATUS OF PARASITES OF THE EUROPEAN  
CORN BORER AT THE CLOSE OF THE 1944 SEASON

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The collection of overwintering larvae of the European corn borer to determine the extent of establishment, maintenance, and dispersion of its introduced parasites was again carried on at the close of the 1944 season. These collections were made from localities in which releases of exotic parasites had been made during the summer of 1944 or previous years. Owing to the continued and increased cooperation of numerous entomologists <sup>1/</sup> in the various States, collections were made in 97 localities including samples from 17 States. Over 38,000 specimens were handled, all by the individual isolation method. The material was reared out in the spring of 1945 following storage over winter. Table 1 is a summary of the results of the rearings.

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<sup>1/</sup> All or part of the collections of borers in the States of Delaware, Illinois, Indiana, Iowa, Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, and Wisconsin were obtained through the cooperation of State Department of Agriculture or Experiment Station entomologists in those States.

Table 1.—Numbers of European corn borer larvae observed for parasitization from different localities in the fall of 1933 and percentage of larvae from which the various parasites were reared.

Release locality State-County-Township	Borers observed	<i>Macrocentrus</i> <i>gifuensis</i>	<i>Lydella</i> <i>grisescens</i>	<i>Inareolata</i> <i>punctoria</i>	<i>Chelonus</i> <i>annulipes</i>	<i>Eulophus</i> <i>viridulus</i>	Native parasites	Total parasitization
	No.	%	%	%	%	%	%	%
<u>CONNECTICUT</u>								
Conn. River Valley	1,896	4.9	0.5	5.1	0.2	0.0	0.0	10.7
<u>DELAWARE</u>								
Sussex, Stockton	661	0.0	12.3	0.0	0.0	-	0.0	12.3
<u>ILLINOIS</u>								
DuPage, Lisle	385	0.0	0.0	-	-	-	0.8	0.8
Kankakee, St. Anne	118	0.0	5.9	0.0	0.0	-	0.8	6.7
LaSalle, Bruce	278	0.0	0.7	-	-	-	2.5	3.2
Logan, West Lincoln	141	0.0	5.7	-	-	-	0.0	5.7
Ogle, Oregon	6	0.0	0.0	-	-	-	0.0	0.0
Rock Island, Black Hawk	368	0.0	0.0	0.0	0.3	-	0.5	0.8
Vermilion, Grant	135	0.0	6.7	0.0	-	-	0.7	7.4
Whiteside, Lyndon	161	0.0	0.0	0.0	-	-	0.6	0.6
<u>INDIANA</u>								
Adams, Union	20	-	0.0	-	0.0	-	0.0	0.0
Allen, Lafayette	50	-	0.0	0.0	0.0	-	0.0	0.0
DeKalb, Butler	49	-	0.0	-	0.0	-	0.0	0.0
Fayette, Harrison	306	0.0	-	0.0	-	-	0.3	0.3
Jasper, Union	502	0.0	0.6	-	-	-	0.2	0.8
Lagrange, Bloomfield	44	-	0.0	-	-	-	0.0	0.0
Noble, Washington	26	-	0.0	-	0.0	-	0.0	0.0
St. Joseph, Warren	473	0.0	0.0	-	-	-	0.0	0.0
Steuben, York	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tipton, Wildcat	370	0.0	4.3	0.0	-	-	0.3	4.6
Warren, Liberty	365	0.0	-	-	-	-	0.3	0.3
Whitley, Union	94	-	0.0	-	-	-	0.0	0.0
<u>IOWA</u>								
Cedar, Dayton	96	2.1	7.3	-	-	-	1.0	10.4
Cedar, Sugar Creek	440	0.2	0.2	0.2	-	-	2.5	3.1
Clinton, Comanche	434	0.0	0.9	0.5	0.2	-	3.7	5.3
Des Moines, Flint River	88	0.0	3.4	-	-	-	0.0	3.4
Jones, Olin	450	3.3	-	0.2	0.0	-	4.9	8.4
Lee, Jefferson	93	0.0	0.0	-	-	-	5.4	5.4
Linn, College	93	0.0	1.1	-	-	-	6.5	7.6
Muscatine, Location "X"	610	0.0	1.1	0.0	-	-	0.2	1.3
Muscatine, Location "L"	566	-	-	-	-	-	0.5	0.5
Muscatine, Sweetland	190	0.5	17.9	0.0	-	-	1.1	19.5
Washington, Oregon	441	0.0	2.7	-	-	-	2.5	5.2



Table 1.---(Continued)

Release locality State-County-Township	Borers observed	Macrocentrus gifuensis	Lydella grisea	Inareolata punctoria	Chelonus annulipes	Eulophus viridulus	Native parasites	Total parasitization
	No.	%	%	%	%	%	%	%
<u>KENTUCKY</u>								
Fayette, Lexington	153	2.5	1.3	0.0	-	-	0.6	5.0
<u>MARYLAND</u>								
Harford, Perryman	173	0.0	0.0	0.0	-	-	0.0	0.0
<u>MASSACHUSETTS</u>								
Middlesex, Concord								
Locality "A"	792	0.9	0.3	10.7	0.0	-	0.0	11.9
<u>MICHIGAN</u>								
Monroe, Erie	342	0.0	16.7	0.0	0.0	0.3	0.0	17.0
<u>NEW ENGLAND</u>								
Southeastern, New England	1,491	10.5	1.3	4.7	1.0	0.0	0.0	17.5
<u>NEW JERSEY</u>								
Atlantic, (English Creek) Egg Harbor	310	0.6	16.1	0.6	0.0	-	0.3	17.6
Bergin, Paramus	444	5.6	1.3	-	0.0	-	0.5	7.4
Burlington, Burlington	2,697	11/	12.0	0.1	0.0	-	0.0	12.2
Burlington, (State Colony), Woodland	339	-	5.9	-	-	-	0.0	5.9
Camden, (Laurel Springs) Gloucester	538	3.9	5.6	-	-	-	0.0	9.5
Cape May, Lower	219	0.0	10.5	-	-	-	0.0	10.5
Cumberland, Millville	270	0.0	3.3	-	-	-	0.0	3.3
Essex, Livingston	423	12.3	2.4	-	-	-	0.5	15.2
Gloucester, Malaga	72	-	-	-	-	-	0.0	0.0
Gloucester, (Hurffville)								
Washington	458	0.9	10.5	-	0.2	-	0.0	11.6
Hunterdon, High Bridge	93	-	-	-	-	-	0.0	0.0
Mercer, Clarksville	390	0.0	5.9	-	-	-	0.0	5.9
Mercer, (Robbinsville), Washington	442	0.0	3.6	-	0.0	-	0.0	3.6
Middlesex, (Jamesburg)								
Monroe	446	2.9	3.4	0.2	7.8	-	0.2	14.5
Middlesex, (Jamesburg) Monroe (Supp.)	731	1.9	3.0	0.7	0.7	-	0.1	6.4
Monmouth, (Colt's Neck)								
Atlantic	2,646	7.0	2.0	1.4	0.1	-	11/	10.5

Table 1.--(Continued)

Release locality State-County-Township	Borers observed	Macrocentrus gifuensis	Lydella grisea	Inareolata punctoria	Chelonus annulipes	Eulophus viridulus	Native parasites	Total parasitization
	No.	%	%	%	%	%	%	%
<b>NEW JERSEY (Con't.)</b>								
Monmouth, Inlaystown	57	-	1.8	-	-	-	0.0	1.8
Morris, Flanders	89	-	-	-	-	-	0.0	0.0
Ocean, (Bayville)								
Berkeley	467	-	8.8	-	-	-	0.0	8.8
Ocean, (Laurelton)								
Brick	397	0.3	6.0	1.5	0.0	-	0.0	7.8
Salem, Piles Grove	475	0.0	6.1	-	-	-	0.2	6.3
Sussex, Sussex	88	-	1.1	-	-	-	1.1	2.2
Warren, Blairstown	86	-	1.2	-	-	-	0.0	1.2
<b>NEW YORK</b>								
Albany, Berne	35	-	3.0	0.0	-	-	0.0	3.0
Albany, Colonie	384	20.6	1.8	-	0.0	-	0.8	23.2
Columbia, (North)								
Kinderhook	470	11.5	0.9	-	0.2	-	0.4	13.0
Columbia, (South)								
Kinderhook	473	34.9	0.4	-	0.0	-	0.6	35.9
Dutchess, Hyde Park	481	8.1	-	-	0.0	-	1.5	9.6
Erie, Catt. Ind. Res.	251	0.0	0.0	15.1	0.0	0.0	0.4	15.5
Greene, Coxsackie	363	24.2	2.5	-	0.0	-	1.1	27.8
Jefferson, Adams	327	0.0	0.0	0.0	0.0	0.0	0.9	0.9
Nassau, (L. Island)								
Hempstead	455	0.0	0.7	-	-	-	0.0	0.7
Rensselaer, Greenbush	384	9.4	4.7	-	0.0	-	0.5	14.6
Rensselaer, Schodack	397	21.9	-	-	0.0	-	1.0	22.9
Saratoga, Malta	191	0.0	-	-	-	-	0.0	0.0
Schenectady, Glenville	103	0.0	0.0	0.0	0.0	-	1.0	1.0
Ulster, Marbletown	361	16.3	-	-	0.0	-	1.1	17.4
Ulster, (Kingston)								
Ulster	383	27.4	0.5	-	0.3	-	1.6	29.8
<b>NORTH CAROLINA</b>								
Camden, Camden	318	0.0	9.7	-	-	-	0.0	9.7
<b>OHIO</b>								
Erie, (Sandusky)								
Perkins	441	0.0	12.5	0.0	0.0	0.5	0.0	13.0
Hamilton, (Cincinnati)								
Colerain	272	0.4	13.6	0.0	-	-	0.0	14.0
Lucas Co., Jerusalem	674	0.0	23.9	0.0	0.0	0.6	0.0	24.5

Table 1.—(Continued)

Release locality State-County-Township	Borers observed	Macrocentrus gifuensis	Lydella grisea	Inareolata punctoria	Chelonus annulipes	Phlophus viridulus	Native parasites	Total parasitization
	No.	%	%	%	%	%	%	%
<b>OHIO (Con't.)</b>								
Ottawa Co., Ross	577	-	1.0	-	-	-	-	1.0
Lucas Co., Adams	593	0.0	0.3	-	0.0	-	0.3	0.6
Lucas Co., Monclova	578	-	0.2	-	-	-	0.2	0.3
<b>PENNSYLVANIA</b>								
Bucks, Buckingham	431	5.8	6.0	0.5	-	-	0.0	12.3
Chester, Kennett	458	0.4	2.8	-	-	-	0.0	3.2
York, York	453	0.0	3.1	-	-	-	0.4	3.5
<b>VIRGINIA</b>								
Accomac, Lee	224	0.0	2.2	0.0	0.0	-	0.0	2.2
Norfolk, Fentress	34	0.0	17.6	-	-	-	0.0	17.6
Northampton, Franktown	147	0.0	0.7	0.0	0.0	-	0.0	0.7
Princess Anne, Back Bay	363	0.0	13.5	0.0	0.0	-	0.0	13.5
<b>WISCONSIN</b>								
Brown, Howard	393	1.3	2.8	-	-	-	0.0	4.1
Calumet, Charlestown	204	4.9	-	-	-	-	4.4	9.3
Dane, Fitchburg	134	-	-	-	-	-	0.0	0.0
Fond du Lac, Springvale	211	0.5	-	-	-	-	9.5	10.0
Grant, Glen Haven, Sec. 18 -								
Lima, Sec. 31	88	-	-	-	-	-	10.2	10.2
Green, Sylvester, Sec. 35	30	-	-	-	-	-	0.0	0.0
Jefferson, Waterloo	160	0.6	1.9	-	-	-	0.0	2.5
Ozaukee, Saukville	333	0.3	2.7	-	0.3	-	0.0	3.3
Rock, Turtle	427	-	0.0	-	-	-	0.7	0.7
Sheboygan, Wilson	278	0.0	0.0	0.0	-	-	0.0	0.0
Walworth, Geneva, Sec. 7	98	-	-	-	-	-	0.0	0.0

1/ T. Trace, less than 0.1 percent.



## CONNECTICUT RIVER VALLEY

The parasitization of all borers from this locality was 10.6 percent in 1944 compared to 11.6 percent in 1943. The most prevalent parasite in the locality is Inareolata punctoria Roman although this species was somewhat less effective in 1944 than in 1943. Lydella grisescens R. D. is becoming very scarce in this locality, only 10 specimens being reared from 1,896 host larvae or 0.5 percent parasitization. On the other hand, Macrocentrus gifuensis Ashm. which was more recently established in the locality and has increased slowly but steadily since, again increased in 1944 moving from 3.6 to 4.9 percent parasitization of the borers observed in 1943 and 1944 respectively. Chelonus annulipes Wesm. though present, shows no indication of increasing.

## DELAWARE

Sussex County, Stockley - A survey covering 154 square miles in southern Delaware around the Stockley, Sussex County locality showed that Lydella grisescens was abundant. It had parasitized 12.3 percent of all borers observed and 17.6 percent of the borers collected within three miles of the release point.

## ILLINOIS

Sample collections of overwintering borers were obtained in eight localities in this State. Lydella grisescens was recovered in the following counties: Kankakee, LaSalle, Logan, and Vermilion. Chelonus annulipes was recovered in Rock Island County. As was to be expected, since most of the releases of parasites were very recent, the recoveries consisted of only a few specimens at each location. No exotic parasites were recovered from DuPage, Ogle, or Whiteside Counties. No recoveries of the introduced parasites, Macrocentrus gifuensis or Inareolata punctoria, were made in this State. The native tachinid, Pyraustomyia penitalis, was recovered in small numbers (less than 1 percent parasitization in most collections) from most of the counties in which collections were made.

## INDIANA

The only recoveries of an introduced parasite in this State in 1944 were from Tipton and Jasper Counties. Lydella grisescens was reared from collections made in these counties and in the former county where releases were made in 1943 parasitization of the borers collected was 4.3 percent. No exotic parasites were reared from collections made in Adams, Allen, DeKalb, Fayette, Lagrange, Noble, Steuben, St. Joseph, Warren, or Whitley Counties.

## IOWA

Cedar County - Lydella grisescens, Macrocentrus gifuensis and Inareolata punctoria or all species released were recovered from collections made in the fall of 1944.

Clinton County - Lydella grisescens, Inareolata punctoria and Chelonus annulipes were recovered from this county.



Des Moines, Lee, Linn, and Washington Counties - Lydella grisescens was the only introduced parasite recovered in 1944.

Jones County - Macrocentrus gifuensis was recovered, 3 percent of the host larvae collected being parasitized by it. This appears to be the best initial establishment of the parasite in the State. One specimen of Inareolata punctoria was also reared from the collections made in this county but no Chelonus annulipes or Lydella grisescens were observed.

Muscatine County - An exceptionally strong recovery (17.5 percent) of Lydella grisescens indicated firm initial establishment of this parasite at the release point in this county. One specimen of Macrocentrus gifuensis was also recovered. Borer collections over a wide area including the parasite release locality in Sweetland Township also resulted in the recovery of this parasite. Collections made approximately 5 miles away from any parasite release point failed to show the presence of any exotic parasites.

#### KENTUCKY

Collections made at Lexington in Fayette County, gave initial recoveries of Lydella grisescens and Macrocentrus gifuensis. Inareolata punctoria was not recovered in 1944.

#### MARYLAND

Harford County, Perryman - No parasites were reared from 173 larvae from this locality at the close of 1944.

#### MASSACHUSETTS

Middlesex County - Parasitization of the borers from this locality at the close of 1944 was 11.9 percent compared to 6.0 percent from a comparable area at the close of 1943. Parasitization of the borers by Inareolata punctoria alone in the fall of 1944 was 10.7 percent.

Macrocentrus gifuensis continues to increase and may become an important limiting factor on the borer. Lydella grisescens hardly exists any longer in the locality, only 2 specimens having been recovered at the end of 1944.

#### MICHIGAN

Borer parasitization by Lydella grisescens totaled only 16.7 percent at the close of 1944 compared to 23 percent at the close of 1943 at the Erie Township, Monroe County, locality. Fifty-four percent of the Lydella grisescens specimens observed were field-collected puparia. One borer parasitized by Eulophus viridulus was observed.

#### NEW ENGLAND

Parasitization of the overwintering borers observed from a region of almost 5,000 square miles in southeastern New England, was 17.5 percent at the close of 1944 compared to 20.4 percent recorded in a similar survey

NEW ENGLAND - Continued

made in 1943. The change was due to a somewhat reduced parasitization by Macrocentrus gifuensis which averaged 10.5 percent in 1944 compared to 16.3 percent in 1943. However, in a number of individual fields, borer parasitization exceeded 25 percent and in one collection 44 percent of the borers were parasitized by this species. The egg-larval parasite, Chelonus annulipes, is present in only a limited part of the territory covered, but in some instances parasitized 12 to 17 percent of the larvae observed. Lydella grisescens remains scarce in the region.

NEW JERSEY

Burlington County, Burlington Township - Lydella grisescens is the only corn borer parasite which is common in this locality. It is widely and rather evenly distributed over a territory of over 250 square miles including a good part of Bucks County in Pennsylvania into which it has dispersed from the New Jersey release location. Parasitization is approximately 12 percent and it has been observed that borer infestation averages lower within the area where the parasites are abundant than in the territory immediately surrounding it.

Monmouth County, Atlantic Township - Very little change in parasitization appears to have taken place from 1943 to 1944 and the total remains at approximately 10 percent. Macrocentrus gifuensis parasitized 7 percent of the host larvae observed. Lydella grisescens, Inareolata punctoria and Chelonus annulipes are also present in the locality but average parasitization of the hosts observed did not exceed 2 percent by any of these species.

Miscellaneous New Jersey Localities - In addition to the extensive series of collections made in Burlington and Monmouth Counties, the results of which have already been discussed, a few sample collections of overwintering borers were obtained at 15 other localities in the State where exotic parasites had been released and at 6 localities where no releases had been made. The collections were made to determine the dispersion of exotic parasites and borer parasitization by native species. The results of rearing this material have been shown in table 1. It may be seen that Lydella grisescens is well distributed and that Macrocentrus gifuensis is established in a number of localities. Inareolata punctoria and Chelonus annulipes have not been so widely distributed as the other two species but they are present in a few localities.

NEW YORK

Hudson River Valley, New York - Macrocentrus gifuensis was found to be well established in the Hudson River Valley with parasitization of the borer ranging from 10 to over 35 percent. This parasite was recovered in the following counties: Albany, Columbia, Dutchess, Greene, Rensselaer, and Ulster. It was not recovered in Saratoga County. Lydella grisescens was recovered from collections made in Albany, Columbia, Greene, Rensselaer, and Ulster Counties but not from Saratoga County. Chelonus annulipes was recovered in Columbia and Ulster Counties.



NEW YORK - Continued

Cattaraugus Indian Reservation - A total of 38 specimens of Inareolata punctoria were reared from 251 host larvae, parasitization being 15.1 percent. This is the highest borer parasitization ever recorded in this locality. The last previous survey was made in 1941 and showed a borer parasitization of only 2.7 percent by I. punctoria.

Jefferson County, Adams Township - No introduced parasites of the corn borer were recovered from the 327 larvae from this county in western New York.

Nassau County, Hempstead Township - Lydella grisescens was recovered but Macrocentrus gifuensis was not recovered from this Long Island county.

Schenectady County, Glenville Township - No introduced parasites were reared from 103 larvae from this old release locality at the close of 1944.

NORTH CAROLINA

Camden County, Camden - Collections of borers in the fall of 1944 showed that Lydella grisescens had become established and was quite abundant. Of the borers observed 9.7 percent were parasitized by this species.

OHIO

Erie County - Parasitization of the borer by Lydella grisescens, in the Erie County, Perkins Township locality as determined by field collections and rearings in 1944 was 12.9 percent compared to 11.7 percent recorded for the fall of 1943. Of the dipterous parasite specimens recovered, 61.8 percent were puparia observed in the field. Parasitization by Eulophus viridulus was 0.5 percent, approximately the same as in 1943.

Hamilton County - A collection of borers from Colerain Township (southwestern Ohio, near Cincinnati) showed that Lydella grisescens is well established from a release made in 1943; and 13.6 percent of the host larvae observed were parasitized by this species. One borer parasitized by Macrocentrus gifuensis was collected but no specimens of Inareolata punctoria were recovered. The latter two species were released here in 1944 for the first time.

Lucas County - Collections made in a 12-square-mile area which includes the Jerusalem Township parasite release locality, showed borer parasitization to be 24 percent by Lydella grisescens. Eulophus viridulus was also recovered but from less than 1 percent of the borers observed. Collections made a few miles away, where parasites have not been released, showed only 1 percent parasitization by L. grisescens, indicating a slight inland dispersion. Borer parasitization in collections made in western Lucas County and including the Adams Township parasite release locality, was less than 1 percent, but L. grisescens was recovered. This was also the case in an area located approximately 5 miles away, thus indicating some dispersion of the parasite.



## PENNSYLVANIA

Bucks County, Buckingham Township - Parasitization of the overwintering corn borer larvae in this locality as revealed by collections made at the close of 1944 was 6.0 percent by Lydella grisescens, 5.8 percent by Macrocentrus gifuensis and 0.5 percent by Inareolata punctoria. Lydella grisescens reached this locality by dispersion (20 miles) from Burlington, N. J. Macrocentrus gifuensis was released in the locality in 1941 and seems to be well established. Inareolata punctoria was not released in the locality until 1944 and thus the recovery of this species in the fall collections of the same year does not necessarily indicate establishment of this species.

Chester County, Kennett Township - An initial recovery of Macrocentrus gifuensis was recorded from the collections made in this locality in the fall of 1944.

York County, York Township - A total of 3.1 percent of the corn borer larvae observed in 1944 from this locality were parasitized by Lydella grisescens. This species had been released here the same year.

## VIRGINIA

Eastern Shore, Accomac and Northampton Counties - Collections made in the Lee and Franktown districts showed that Lydella grisescens is still present on the Eastern Shore but is very scarce, parasitizing only 1 or 2 percent of the larvae.

Princess Anne and Norfolk Counties - Lydella grisescens remains abundant in Princess Anne County and appears to have dispersed into Norfolk County. In the Back Bay district of the former county, borer parasitization by this species was estimated at 13.5 percent at the close of 1944.

## WISCONSIN

Brown, Calumet, Fond du Lac, Jefferson, Ozaukee, Rock, and Sheboygan Counties - Macrocentrus gifuensis was recovered from all but one (Sheboygan) of the counties in which it has been released in this State. Chelonus annulipes was recovered from Saukville Township in Ozaukee County which was the only locality in which it has been released. Inareolata punctoria had been released in Sheboygan County but was not recovered. Lydella grisescens was recovered from Brown, Jefferson and Ozaukee Counties but not from Sheboygan or Rock Counties. All recoveries of imported parasites were small in numbers, usually 1 or 2 percent of the hosts observed, as might be expected since the parasite releases are of recent date.

Collections of corn borer larvae were also made in Dane, Grant, Green, and Walworth Counties in order to check on the prevalence of native parasites. Puparia of the tachinid, Pyraustomyia penitalis, were observed in the field and small numbers of adults of this species were reared, largely from borers collected in Calumet, Fond du Lac, and Grant Counties.